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ABSTRACT

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Proficiency Verification Systems: A Large-Scale, Flexible-Use Program for Evaluating Achievement in Mathematics

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ABSTRACT

Proficiency Verification Systems (PVS) is a new concept in providing management information about local achievement in basic skills. The program includes a network of assessment and reporting components which can be combined in varied ways to generate proficiency information about individual pupils and groups, for teachers, principals, and school administrators. A key feature is the capability to summarize reports according to use of specific instructional programs, and to provide background results obtained from all users of the system.

Initial field testing and revisions began in 1975-76 and continues with over 20,000 pupils in three states.

INTRODUCTION

Proficiency Verification Systems (PVS) is an assessment and reporting program which teachers and administrators can use to show what skills pupils have developed successfully during the school year. The program integrates a variety of skill inventories with different ways of reporting results. It was developed at SWRL from more than ten years of research on criterion-referenced measurement to provide comprehensive information for better acknowledgement of instructional accomplishments in individual classrooms, schools, and entire school systems. Local school districts choose from among the PVS components the specific combination they wish to use, and have several options for deciding how results are to be reported. PVS skills inventories are simple to administer and require no scoring by teachers.

Several characteristics of the PVS program are unique among systems that are currently available for organizing information about pupil accomplishments.

- School districts can customize their own information system by choosing PVS components and reports to satisfy unique local needs.
- Remote data processing is unnecessary for many PVS components. Information for week-by-week classroom instruction is generated and organized exclusively at the classroom level to eliminate delays inherent in computer processing and to ensure that this information will always be available for classroom decisionmaking where and when it is needed most. Only when broader profiles are desired to periodically provide information pertinent to the instructional accomplishments of a set of schools or the district as a whole is remote data processing incorporated into PVS operations and procedures.

- PVS reporting systems are able to tie inventory results directly to specific programs that local schools are using regularly for classroom instruction.
- National reports provide local schools with comparison data from all other schools and districts using PVS with due regard for the protection of personal and institutional privacy.
- Separate reports are provided for classroom teachers, principals, and district administrators. These reports describe instructional accomplishments ranging from overall achievement by an entire district to diagnostic profiles of individual pupils.
- In operation, PVS allows local school districts to maintain their own data bases and procedures for how skills inventories are administered and reports are used. Districts can maintain maximum confidentiality for teachers and pupils by assigning their own data processing codes to materials that are returned to SWRL for scoring and processing. Local schools have complete control over school, teacher, and pupil identification within the system.

The R&D associated with PVS promises to deliver clearly in the 1970's what was glimpsed obscurely by researchers in the 1960's as "computer managed instruction," "criterion referenced testing," and "instructional task analysis." The products that comprise a Proficiency Verification System provide for schools the immediate resources that CMI, CRT, and ITA separately will never provide--a means of directly relating their instructional objectives, instructional materials, and standardized tests, with

allowances for choice, uniqueness, and commonality at the class, school, and district level.

PVS R&D bears some relationship to the literature and activity being generated at such locations as LRDC, UCLA, the University of Wisconsin R&D center and faculty, Florida State University, ETS, NAEP, UC Santa Barbara, University of Minnesota, University of Massachusetts, and so on; school districts such as Los Angeles, Dallas, Miami; state departments such as California, Michigan, Florida, New York; publishing firms such as Harcourt, McGraw-Hill, SRA, Houghton Mifflin; and computer firms that have now dwindled essentially to Control Data, Hewlitt Packard, and National Computer Systems.

PVS R&D as such began at SWRL under NIE contract to design and initiate the development of Proficiency Verification Systems in Mathematics and in Reading. The objective is to generate sets of pupil inventories in mathematics and reading that have firm grounding in existing instructional programs in elementary schools, and to use these inventories as the nucleus of a system that provides local school districts a means of collecting and reporting information to show local instructional accomplishments at various levels of school district organization. To date, a fully operational system in mathematics has been developed (Buchanan, 1976) and is currently being used with over 20,000 pupils in four states. The groundwork has also been established for a comparable system in reading (Fiege-Kollmann, 1977).

Although PVS development began with the NIE procurement, the "rapid" development progress of PVS was enabled by programmatic R&D at SWRL over the past ten years. The scoring and reporting structure (Milazzo, 1976),

which currently uses the NCS Century Model 7010 Optical Mark Reader, has benefitted from SWRL's earlier research on systems to provide comprehensive instructional management information (Behr and Gibbs, 1975). The Fortran IV software for PVS uses some of the same routines for compiling data as the Quality Assurance program (Wolfe, 1976) which SWRL maintains to assess the effects of its own instructional products. The substantive structure of PVS Inventories, which incorporates the basic content domains of prevailing mathematics programs within a single item pool, bears some relationship to an earlier SWRL study (Hanson, 1977) that determined and contrasted the effects of different programs for teaching reading readiness in kindergarten. To establish the needed structure for PVS, it has been necessary to obtain robust techniques for analyzing instructional programs across several grade levels. These techniques evolved from computer-assisted, analytical procedures, that were developed between 1973 and 1975 for SWRL's Learning Mastery Systems. The latter were criterion-referenced systems for assessment and remediation that were developed by SWRL to accompany specific, commercial programs in mathematics and reading.

SWRL's R&D in PVS is part of a line of inquiry related to "schooling and learning." PVS activities are designed to treat "schooling and learning" as a joint phenomenon that can be observed directly, without regard to preconceived notions of how the learning act occurs or what pupils need to accomplish. The intent is to make objective descriptions of what pupils are expected to learn based on the substantive content of their formal learning experiences, and to structure the flow of information about actual skill development accordingly. What is implied by proceeding in this way is

that "schooling" is as much a social phenomenon, that is amenable to bona fide scientific inquiry, as it is an institutionalized service in need of evaluation.

PROGRAM COMPONENTS FOR GENERATING INFORMATION

The core of the PVS program consists of three types of skill inventories designed for use at specific points during the school year. It also includes a straightforward system used entirely within the classroom for collecting and organizing small bits of information about the progress of each pupil as a more-or-less continuous record-keeping process maintained by the teacher during the school year. Each of the skills inventories can be extended by special components that will be available in PVS (1978), depending on the needs of local schools and their ability to commit more pupil and teacher time to the maintenance of a more comprehensive information system.

Proficiency Skills Inventory

The primary tool is the Proficiency Skills Inventory (PSI) that is used typically at the end of the school year. This inventory is a comprehensive set of items representing skills that are regularly developed across the country at particular grade levels. The set of items for each grade level is obtained and regularly updated from a methodical and detailed analysis of mathematics programs, standardized achievement tests, and curriculum guides that are widely used for instruction in the elementary school.

The extent to which serious analysis of mathematics programs is a cornerstone for developing skill inventories is unique to the PVS program. Most standardized achievement tests anchor their achievement norms to gross differences in instructional content across grade levels, but there is no commitment to any sort of comprehensive representation of the wide variety of skills developed within a single grade level of instruction. In PVS, inventory items are chosen on the basis of what pupils are likely to have the opportunity to learn. The main criterion for the inclusion of an inventory item is whether it resembles, to any significant degree, the kinds of instructional items that pupils are expected to solve in one or more major mathematics programs. Items are not rejected in PVS simply because they are too easy or too difficult. If an item is like the content of current instructional materials, then it belongs in a PVS inventory. This instruction-based rationale for item suitability varies somewhat from common practice for constructing standardized tests, where individual items must exhibit certain characteristics in use for them to contribute to reliability of the overall test. In such a setting, the suitability of items must be based partly on factors that have little direct relationship with actual instruction and opportunity to learn.

Levels (1, 2, ...) of the PSI correspond indirectly to conventional grade levels, since age-graded patterns for school organization continue to prevail across the country. However, it is not necessary that a particular level of the PSI be used exclusively with pupils at the corresponding grade level. The designated level of materials that pupils regularly use during instruction is the key, regardless of their assigned grade in school, since

items at each level of the PSI are determined by the organization of materials in existing mathematics programs. What this means, for example, is that use of Level 2 of the PSI with grade 3 pupils is perfectly proper if these pupils regularly use a textbook intended for normal use in grade 2.

In operation, each level of the PSI is printed in four forms (A, B, C, and D). Dividing the total item array into multiple forms is necessary since too many items are included in the overall inventory for any one student to take within a reasonable amount of classroom time. In actual administration, all four forms are given in each classroom in a balanced way so that all items on the PSI are represented for each group of pupils taking the test. In the school and district overall, this mean that each item will have been given to a large number of pupils, although not all pupils will have responded to <u>every</u> item in the total array of PSI items.

Some items on the PSI represent skills that are more important than others for pupils to develop. From an analysis of mathematics programs, curriculum guides, and standardized testing programs, it is readily apparent that not all skills taught in the elementary schools have the same level of importance. At each grade level there are a number of minor skills that receive relatively little instructional time. The most important skills are benchmarks to the entire mathematics sequence since they are closely interrelated with skills from preceding grade levels and with skills that are programmed to follow at a much later time.

At each level, each form of the PSI is divided into two parts which can be administered separately on different days. Part One contains all of the items related to benchmark skills, which are mainly in the areas of number recognition, computation facts, computation algorithms, and verbal problems. All of the items in Part One are the same on all forms

of the inventory at each level. By designing the inventory in this way, each pupil responds to enough items representing the benchmark skills so that teachers can receive diagnostic profiles of performance by individual pupils and by the entire class. Only on Part Two, representing skills that are not of prime importance at each grade level, are items varied on different forms of the inventory. This way, all of the material typically developed at a particular grade level can be represented in a single inventory, and, at the same time, diagnostic information can be obtained for each pupil on benchmark skills.

For each pupil, the PSI consists of 70-80 items, and usually requires two class periods of about 40 minutes each for administration. More time may be used if necessary since inventory results are not intended for interpretation against a "normal" sample of pupils who have taken it previously under standardized conditions. This way, the PSI gives a more complete representation of what pupils are able to do in relation to what is expected and what skills they are likely to have had the opportunity to learn.

Current versions of the PSI consist entirely of multiple-choice items. Skills requiring pupil reactions which cannot be adapted very well to a multiple-choice format are reserved for special PVS inventories.* These skills include numeral writing, geometric constructions, open-ended problems with a variety of possible solutions, and so on. For Levels 1-3, pupils mark answers directly on a scannable inventory booklet. Separate, scannable answer sheets are used with inventories for Levels 4-6.

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*These inventories are still under development and will not be available until 1978.

Beginning Skills Inventory

PVS includes an inventory for obtaining baseline and readiness information, called the Beginning Skills Inventory (BSI), designed for use near the start of the school year. Each BSI includes: (1) major skills that were scheduled for development during the previous year and (2) extensions of these skills that are likely to take place during the coming year. The items included are obtained from PVS analysis of widely-used programs, curriculum guides, and standardized tests using the procedures described earlier for the Proficiency Skills Inventory.

Beginning Skills Inventories are available for Levels 1-6 corresponding to age-grade levels of conventional school organization in the same ways described for the Proficiency Skills Inventory: the level of the BSI that is appropriate for a particular group of pupils depends on the designated level of instructional materials they are using, and not necessarily, on their age or grade in school.

The items of the BSI at each level focus on a combination of most of the same benchmark skills represented in Part One of the Proficiency Skills Inventory. Some skills on the BSI parallel benchmark skills from the Proficiency Skills Inventory for the previous level, and some items represent extensions of benchmark skills in the current level. The BSI is not a pre-test. It does not include items that are totally different from instruction the pupil should have had previously. Some skill extensions are a part of the BSI but they consist of items or problems that look much like material studied before and can be solved with minimal transfer from previous learning. For example, in Level 3, the BSI includes items on 2-digit and

3-digit addition, although most pupils will have had only 2-digit addition during the previous year. On the other hand, the BSI for Level 3 does not include items on the multiplication algorithm, because this content is not introduced in major mathematics programs until midway through grade 3 and would be totally new for pupils at the beginning of the school year. The key for the BSI is what skills pupils have had an opportunity to learn previously, and what they are likely to know already by way of simple, direct generalization of skill learning from the previous year.

Each level of the Beginning Skills Inventory has only one form, so all pupils are given the same items. Skills related to Part 2 of the Proficiency Skills Inventory are only represented indirectly, if at all, on the BSI, since information about such skills would have limited usefulness for teachers and administrators in developing their long range plans for instruction at the beginning of the school year.

The BSI for each level consists of 30-40 multiple-choice items, and usually takes one class period of 35-40 minutes to administer. More time may be taken, if necessary, since test conditions are not intended to be standardized. All of the items on the Beginning Skills Inventory have multiple-choice formats. Pupils mark answers directly on the inventory booklet for Levels 1-3. For Levels 4-6, they use a separate answer sheet.

Mid-Year Inventory

The Mid-Year Inventory (MYI) is designed to be used around the last two weeks in January. It is a set of items that show what pupils have accomplished by the time they complete the first half of the school year. Development of the MYI is based on the same analytical techniques that are involved in the Proficiency Skills Inventory.

A Mid-Year Inventory is provided for Levels 1-6, corresponding to age-grade levels in conventional school organizations in the same way as the Proficiency Skills Inventory and Initial Skills Inventory. The criteria for selecting the appropriate level of the MYI for any group of pupils is the level of instructional materials they are using regularly, not their grade level in school.

Within each level of the MYI, items focus on the same benchmark skills represented in Part One of the Proficiency Skills Inventory. The inventory itself is divided into sections according to the major benchmark skills and sub-skills. Although the inventory is intended for use as a mid-year progress report, the items cover projected instruction for the entire year. This way, teachers may use the MYI in a variety of ways. It is not necessary, for example, to use a textbook in chronological order. The teacher should only administer the sections on the MYI representing instruction on benchmark skills that pupils have already completed during the first half of the school year. Sections of the inventory on skills that are direct extensions of instruction during the first half of the year may also be administered, but teachers are <u>not</u> encouraged to give sections of the MYI dealing with skills or concepts that will be introduced for the first time later in the year.

Each level of the MYI has only one form, so items will be the same for all pupils. Skills that are like Part Two of the Proficiency Skills Inventory are represented only indirectly in the MYI.

The Mid-Year Inventory at each level consists of 30 to 40 multiple-choice items, and usually requires one class period of 35-40 minutes for administration. More time may be taken if it is needed, since the MYI is intended to be more representative of what pupils can do in relationship to what has been presented during instruction, than what pupils can do in a rigidly-controlled time frame.

Learning Mastery Profiles

For week-by-week management of instruction, PVS provides a series of Learning Mastery Profiles developed specifically to accompany major, commercial programs in mathematics. Basically, a Learning Mastery Profile assists the teacher by identifying brief skills checks from pupils' work in regular, day-to-day instruction, and in organizing this information as a record of pupil progress on a continuous basis during the year. The basic component is simple to use, since it makes use of the instructional materials that already are in use in the classroom. Separate materials for assessment and practice are available from SWRL in kits called "Learning Center Resources." These materials are not part of the regular PVS program, but were designed for coordinate use with the Learning Mastery Profiles.

The major component is a separate Profile sheet, for maintaining a record of performances for each pupil during the year. The Skills Checks are shown here alongside spaces for designating how well pupils have done. In addition, spaces are provided for organizing other important information about pupils' performances including: chapter tests and level tests from the regular mathematics program, the PVS Beginning Skills Inventory, Mid-Year Inventory, and Proficiency Skills Inventory, guidelines for pacing instruction during the year, and so on.

Spanish-Language Versions of PVS Inventories

All PVS Inventories in Mathematics have English and Spanish versions. At grades 1, 2 and 3, where pupils mark directly on the PVS booklet, there are parallel sets of booklets in both languages. In addition, at the higher grade levels, the standard answer sheet contains directions in both Spanish and English.

PVS REPORTS

During the school year, PVS provides a series of reports with information channeled to key personnel at different levels of school district organization. Reports for individual pupils and classrooms are sent to teachers; reports for schools are sent to the various principals; and reports for the district are sent to a designated PVS coordinator within the district administrative staff.

PVS has an important capability to report on how pupils in different instructional programs performed on all items in PVS components and on just those items that represent the programs they are using. This kind of report is possible because of the way PVS inventories are developed. All items on PVS inventories come from an analysis of major instructional programs, curriculum guides, and assessment programs. Each item in a PVS component is "tagged" with a record of the resource where it originated. Some items are common to a number of instructional programs and other resources. Others represent a part of instruction in only one program.

Characteristics of PVS reports vary somewhat with each of the skills inventories. The way data are organized and the kinds of data included in the report are not the same, because the results of different PVS inventories used during the year are not likely to be used in the same way. Reports from the end-of-year Proficiency Skills Inventory, for example, are very likely to be used in overall consideration of how well an instructional program has met district needs during the school year, so these reports include a breakdown of pupil proficiencies by instructional programs within the district and across the national population of PVS users. On the other hand, reports

from the Beginning Skills Inventory are more likely to be used in long-range planning for the school year, and a breakdown of results by program would not meet the same kinds of information needs that are associated with the Proficiency Skills Inventory.

The data provided in PVS reports are intended to satisfy dual needs for evaluation of instruction that has already taken place and for long-range, diagnostic planning. In most cases, the reports for the Proficiency Skills Inventory show the full range of reporting characteristics in PVS. For all other components, the characteristics of PVS reports are the same, essentially, but they are not as extensive.

Proficiency Skills Inventory

For the Proficiency Skills Inventory, there are four basic reports. Other reports may also be generated, depending on the arrangements made with individual school districts, but they are not part of the regular set of reports and may require additional information about pupils, district programs, and the local community.

The first report, called the PVS National Report, shows how the entire population of pupils in PVS did on the PSI items. This report is in four parts that examine successively smaller units of the results as follows:

PART 1: RESULTS ON OVERALL INVENTORY

PART 2: RESULTS ON BENCHMARK SKILLS

PART 3: RESULTS ON ALL SKILL AREAS (BENCHMARK AND NONBENCHMARK)

PART 4: RESULTS ON INDIVIDUAL ITEMS.

In Parts 1, 2, and 3, the results are shown as follows:

AVERAGE SCORE BY ALL PUPILS

AVERAGE SCORE BY PUPILS IN PROGRAM X*

:ON ALL ITEMS

:ON ITEMS FROM PROGRAM X

AVERAGE SCORE BY PUPILS IN PROGRAM Y

:ON ALL ITEMS

:ON ITEMS FROM PROGRAM Y

In Part 4, the results for each item are broken down as follows:

PERCENT OF PUPILS ANSWERING CORRECTLY

:ALL PUPILS IN PVS

:PUPILS IN PROGRAM X

:PUPILS IN PROGRAM Y

The second type of report, called the PVS District Report, is structured in four parts just as the National Report. This report also has the same breakdown of information as the National Report, but it is focused on programs used within the district and the performance of district pupils.

The third type of report is for principals within the district. The PVS School Report comes in two parts showing how pupils within a specific school performed on the test overall and on benchmark skills. Within each part the results are reported for all pupils within the school, and for pupils in each instructional program that teachers are using. A separate report showing pupil performances on each item is also provided routinely in the PVS School Reports.

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*In actual reports, programs will be identified by an abbreviated program name (e.g., HM/Mathematics for Individual Achievement). A key to these names will be given at the beginning of the reports.

The fourth type of report is the PVS Classroom Report for each teacher administering the Proficiency Skills Inventory. This report comes in three parts with information focused on individual pupils. The first part shows how individual pupils performed on each of the benchmark skill areas, and their overall score on other areas of the PSI that reflect instruction in their regular program. The second part of the report shows what percent of pupils in the entire class answered correctly on each benchmark item, which are described in terms of their mathematics objectives. The third part lists those pupils who scored less than 50% of the items correct on any particular benchmark skill area.

Reports for the Beginning Skills Inventory

The reports for the Beginning Skills Inventory are less extensive than reports for the PSI. Four reports are generated just as with the PSI, but the internal structure of each report is a little different. The National Report for the Beginning Skills Inventory has two parts as follows:

PART 1: RESULTS ON OVERALL INVENTORY AND ON BENCHMARK SKILL AREAS

PART 2: RESULTS ON INDIVIDUAL ITEMS

No breakdown by instructional program is given for BSI results, since it would have little, clear utility for planning at the beginning of the school year. For each item or skill area, a single result is given that shows the performance by all pupils in PVS. The District Report is divided into two parts showing overall district performances on benchmark skills and on individual items. The School Report has two parts showing overall school performance on benchmark skills and on individual items. No breakdown of results by instructional program is given for the

District Report or School Report. Classroom Reports have the same three-part structure as they do on the Proficiency Skills Inventory.

Reports for the Mid-Year Inventory

The Mid-Year Inventory has four major reports with the same structure as the beginning Skills Inventory. However, like the Proficiency Skills Inventory, the MYI Reports feature a breakdown of results by instructional programs. In addition, the National, School, and District Reports also show how much of each instructional program has been completed by mid-year. For example, Part I of the District Report, showing results on benchmark skill areas, also shows the number of pupils that took each section of the Mid-Year Inventory. Since teachers administer only those sections of the inventory that correspond to what has been completed by mid-year, the number of pupils that take each section of the inventory provides administrators with an estimate of how much of the program has been completed across the district.

Reports on Learning Mastery Profiles

No regular PVS reports are given on results generated by the Learning Mastery Profiles since this component is used entirely within the classroom, and no data are forwarded for additional processing.

GENERAL OPERATIONS AND PROCEDURES

PVS has been designed and modified a number of times in order to create a system that will generate a maximum amount of information about skill development for a given investment in teacher and pupil time. The

major inventory components in the nucleus of the PVS network are the necessary working units of a system that can provide teachers and administrators with the information they have said is needed to maintain effectiveness in the development of mathematics-related skills. While any information system requires an investment of time from teachers and pupils, PVS inventories are designed for an effective balance between processing costs to users and the amount of time required for administration and preparation for data processing. In practice, the use of PVS is little more complex than ordering components, returning data to SWRL for processing, and receiving reports.

Initializing Data Processing

Designation of District PVS Coordinator. At the time initial orders of PVS components and/or reports are submitted, a PVS coordinator is designated by the local school district to receive and distribute all PVS materials, including reports, and to set up procedures for processing of test results. These procedures insure maximum compatibility of district use of materials with the system of procedures already established in PVS for efficient management of computer processing of results and the return of reports to appropriate district personnel.

Assignment of Processing Codes. All PVS data processing is done by identification numbers given to each district, school, and teacher/classroom that is going to submit materials for processing during the year. SWRL assigns a number to each district, and the PVS coordinator, in turn, assigns numbers to each school and classroom. The procedures for assigning school and classroom numbers are quite simple.

The district coordinator receives two types of forms for initializing the district data base. The first form, called the District Coordinator's School Identification Sheet, is used by the PVS coordinator to assign schools to a set of 3-digit codes that are pre-printed on the sheet. The sheet itself is actually a "sandwich" of four self-carboning pages with spaces for fifty schools. When school codes are assigned, the top copy is returned to SWRL at least one week prior to the time inventories will be submitted for data processing. This sheet is used to check school and district codes on sets of inventories from each classroom as they are sent to SWRL for processing. Additions, deletions, and other changes in the list of school codes can be made by the PVS coordinator at any time during the year as long as a copy of such changes is sent to SWRL at least one week prior to the time inventories are sent for processing. The important thing is for PVS coordinators to keep an up-to-date record of school codes, since the routing of information to teachers depends entirely upon accurate school and teacher information.

The second type of form that the coordinator receives is the PVS Principal's Teacher Identification Sheet. Fifty or more copies of this form accompanies the PVS Coordinator's School Identification Sheet. On each sheet, the coordinator writes the school name and the same identifying number that was assigned to the school on the PVS Coordinator's Identification Sheet (the district number has already been pre-printed on each of the fifty sheets). Each of the Principal's Teacher Identification Sheets is then forwarded to appropriate schools so that the principal or a designee can assign a 2-digit identification code for each teacher who is going to submit tests to SWRL for processing. Teachers use this code

on all materials returned to SWRL. The principal's sheet is attached to a pre-addressed mailing card containing a carbon copy of the school name and code and the district name and code, but no teacher names or codes. The principal or designee removes the card and returns it directly to SWRL as soon as the sheet is received from the PVS coordinator. Receipt of this card confirms the school's participation in PVS for the coming year. SWRL routinely checks the school name and number against its copy of the PVS Coordinator's School Identification Sheet to ensure that these codes match. No teacher names or codes need to be forwarded to SWRL. This way, classroom reports are identified only by teacher codes. This procedure places responsibility on each school to maintain the list of teacher codes in order to channel each PVS classroom report to the appropriate teacher. The list of teacher codes can, of course, be changed by the school at any time, and it will not affect SWRL processing of results or the generation of PVS reports. This characteristic of PVS provides maximum flexibility at the school level for adapting use of PVS to changes in teacher assignments and in school and classroom organization during the school year, as long as a record of these adjustments is maintained at the school level so that all teachers receive the appropriate PVS classroom report dealing with their students.

In general, no other initialization procedures are required for use of regular PVS components. The Learning Mastery Profiles are used entirely within the classroom, with no data forwarded out of the classroom to district administrators or SWRL.

Report Initialization

Receipt of reports for the Beginning Skills Inventory, Mid-Year Inventory, and Proficiency Skills Inventory requires no special initialization procedures. Reports at the national, district, school and classroom levels are generated automatically for the populations participating in each particular inventory.

Administering Inventories and Other Components

General Procedures. Administration of regular PVS Inventories (BSI, MYI and PSI) is straightforward and simple. These inventories are group-administered, and all items are multiple-choice. The PSI is ordinarily administered during the first two weeks in May to allow time for return of reports to teachers before school is out. The BSI is ordinarily administered during the last two weeks in September and the MYI during the last two weeks in January. Levels 4-6 of all PVS inventories, and the end-of-year inventory for Level 3, have separate answer sheets for pupils to mark responses. For identification, pupils mark their first and last initials. A space is provided for teachers to give each pupil an optional identification number, which they may want to use in cases where two pupils have the same initials. Pupils also mark their grade level (or some similar designation used in the school organization), test level, and, on the PSI they mark the form (A, B, C, D) they are taking. Pupils mark answers to items directly on the booklet for all inventories at Levels 1 and 2, and for the Beginning and Mid-Year Inventories at Level 3. They also mark their initials (first and last) and grade level, but do not mark the form or level since this information has been pre-coded on the booklet.

SWRL assumes no responsibility for information that is not recorded on classroom materials or not coded correctly. Teac'ers are advised to quickly scan booklets or answer sheets to see that information has been properly coded.

Matching Levels of PVS Inventories to Levels of Program Materials. Teachers match levels of PVS inventories to the level of program materials that pupils are using in regular instruction. It is common practice for instructional groups and entire classrooms to use instructional materials from a particular program that are "below conventional grade level." In such cases, teachers use the level of PVS inventory that matches the level of materials pupils are using, so the inventory level that pupils mark on their answer sheets differs from their grade level in school. By assigning inventories in this way, pupils are credited for having achieved a higher grade level, even though they are currently working out of materials intended for a lower grade level in the conventional school organization. Pupils who are using program materials in this special way (i.e., grade levels in school do not match inventory levels) have their inventory results summarized at the classroom level in the same way as other pupils in the class. But on school and district reports, these special inventory results are summarized in a separate column on the report. In such cases results are divided according to regular use of programs and PVS inventories (grade level and PVS inventory level match) and special use of programs and PVS inventories (grade level and PVS inventory level do not match).

Special Procedure for the Mid-Year Inventory. The Mid-Year Inventory has an extra procedure in administration because of its design. Items in this inventory are grouped by module according to "steps" in the development

of benchmark skills, and all benchmark skills for the year are included. In this way, PVS does not penalize teachers who do not complete instruction in these textbooks in a linear sequence. Before this inventory is adm'nistered, the teacher must identify those modules on the inventory that represent the instruction that has actually been completed during the first half of the school year.

Procedures for Use of the Learning Mastery Profiles. Since the Learning Mastery Profile is not a formal assessment component, it is used in a different way during the school year. There are two parts to the system: (1) a set of Skills Checks to be performed by the teacher in routine "grading" of regular practice from the pupil's text, and (2) a set of record-keeping materials for organizing the information about pupils' progress. The Skills Checks are designed to accompany instruction in a specific mathematics program; different instructional programs have different SWRL-designed Learning Mastery Profiles.

In use, the teacher refers to the User's Guide for identification of specific problems in regular pupil materials which can be spot checked in practice activities, in order to obtain continuous feedback on how well each pupil is progressing. A Skills Check seldom amounts to more than three or four problems from any given activity, and not more than one or two activities designated as Skills Checks would occur in a typical week of instruction. Of course, teachers may check more of pupils' work than just the problems designated as Skills Checks, but these problems should be sufficient to make up a profile of pupil progress. As Skills-Check problems are examined in pupils' work, the teacher notes results on the

special Profile sheet provided for each pupil. Opposite each Skills Check, the teacher makes an informal judgment of how well a pupil has done by circling a +, ✓, or −, to denote a "good," "adequate," or "less than adequate" performance. Skills Checks are grouped according to major skill areas involved in the structure of PVS inventory components, so that results of these "checks" on each profile sheet show the progress each pupil has made in each skill area.

During the year, as pupils complete units of textbook activities, the teacher can record results of chapter tests from the regular program in spaces provided on the Learning Mastery Profile sheet. In addition, scores on benchmark skill areas of the Beginning Skills Inventory, the Mid-Year Inventory, and the Proficiency Skills Inventory can also be recorded in special spaces provided on the Profile sheet. In this way, a complete record of each child's performance is constructed as the year progresses.

Sending Pupil Materials for Scoring and Processing

Submitting PVS Components. The procedures for returning results for scoring and data processing are the same for all regular PVS inventories. As soon as administration is completed, teachers are advised to take a few minutes to check pupil coding of first and last initials, PVS inventory level, and grade level. They are also advised to generally check pupils' marking of answers, to assure proper machine-scoring, since SWRL does not assume responsibility for "clean up" of stray marks, poorly marked answers, or incomplete erasures. Teachers may assign a number to each pupil (in addition to first and last initial) if desired. A place is provided for a supplementary pupil-number on the booklet (levels 1-3) or answer sheet

(levels 4-6). Such a number is often useful in differentiating between pupils with the same initials, and for other record keeping such as coordination of reports with pupil numbers in the teacher's regular record book. All other PVS components are sent to SWRL using special procedures arranged with district.

Completion of Classroom Identification Sheets. Each set of inventory materials returned to SWRL is identified by a Classroom Identification Sheet. This sheet has spaces for marking the district, school, and classroom codes, and a special code for the instructional program in use in the classroom. In instances where a teacher uses entirely different programs with different instructional groups, separate Classroom Identification Sheets can be marked (with different program codes) for each set of inventories.

The inventories and Identification Sheets are returned to the school principal who mails all classroom sets to SWRL at the same time. The principal has responsibility for seeing that all inventories are administered and results returned to SWRL in time for processing. Under normal conditions, the Beginning Skills Inventory is scheduled to arrive at SWRL by October 1, the Mid-Year Inventory by February 1, and the Proficiency Skills Inventory by May 15.

Distribution of PVS Reports

In most cases, PVS classroom reports are returned within 5 to 10 days of their receipt at SWRL. School and district reports are returned as soon as all inventories have been received at SWRL. In any case, schools and districts receive all reports from the Beginning Skills Inventory by about October 20, the Mid-Year Inventory by February 20, and the Proficiency Skills Skills Inventory by June 15.

Districts have considerable flexibility in deciding how reports are to be received and distributed. They may designate whether teacher and principal reports are to be returned to the PVS coordinator or directly to the principals and teachers. Under regular procedures, all reports are sent to the PVS coordinator. Classroom reports are all enclosed in separate envelopes, packaged by school, together with the school report. Each report is sealed, even though the PVS coordinator distributes school packages to principals, who, in turn, distribute classroom reports to teachers. In this way, each member of the district personnel receives information specifically pertaining to their level of interest, unless special information-handling arrangements are made among administrators, principals, and teachers.

An arrangement can be made where all classroom and school reports are mailed directly to teachers and principals. By request (and at additional cost), the PVS coordinator can receive a copy of all school and classroom reports, although principals and teachers will be notified that response has been made to such a request. Under special arrangements, all reports are distributed in the same way. If any principals and teachers in a district receive reports directly, then all must receive them in the same way. If district coordinators wish to have copies of any school and classroom reports, then copies of all school and classroom reports will be sent to the district coordinator. Similar procedures apply for school principals who may want their own copy of each classroom report.

DEVELOPING A LOCAL PROFICIENCY VERIFICATION SYSTEM

Proficiency Verification Systems is actually a large network of assessment and management components, reports, and other surveys and services which are available for local districts to develop information systems to meet their own needs. SWRL's position as a research and development institution allows for districts to develop a cooperative relationship with SWRL in selecting components and services, but also in designing new ones that do not presently exist.

Selection of PVS Components. PVS components can be selected by school districts in patterns that best fit local needs for information about proficiency development. Information generated by PVS components can be used in a variety of ways including long-range planning, program accomplishments, and instructional management by individual teachers from week-to-week.

Adapting PVS Reports to Local Information Needs. A local system can phase-in the amount of information it receives with the ability of the district organization to use large quantities of highly detailed data at several points during the school year. Through in-service training on the interpretation and application of specialized data, local school organizations can continually increase their capacity for evaluating and improving the quality of instruction which they provide.

PVS can supply an unprecedented amount of information for reasonably modest investments of time from administrators, teachers, and pupils.

Developing Local Channels of Information Flow. Distribution options for PVS reports provide school districts with a unique opportunity for cooperative development among administrative and teaching personnel to share proficiency information. In normal use, PVS coordinators do not have information on performances below the district level, while teachers will not have macro-summaries above the level of their own classroom. Effective use of PVS information mandates cooperative use of proficiency information across several levels of school organization, all for the purpose of improving instruction and opportunities for children to learn needed skills. SWRL can best function in this arena by providing technical assistance in adjusting information on each report, and by adapting the routing of PVS reports to patterns of information flow developed by personnel from all levels of the administrative structure.

CONTINUING DEVELOPMENT IN PVS AS PART OF ONGOING RESEARCH AND DEVELOPMENT

SWRL maintains a continuous program of research and development in PVS and in other areas of education information systems as well. Districts who use PVS have the opportunity to not only implement new developments as soon as they are available, but to participate in such development through cooperative planning, in order to meet local needs.

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